Wanted: Balance

For the Forests & Pests of the West

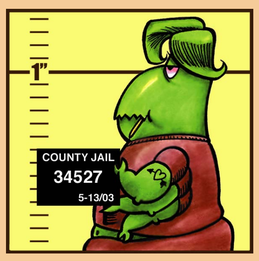
"Bad-Worm Bud"
alias
Western Spruce Budworm
Leader of the Bad Bugs

Highly destructive. Weakens Douglas fir and Grand fir by preying on new needles. Victims turn rusty red-brown.

Late instar Western Spruce budworm left and typical defoliation of a grand fir by the insect.

The Bad Bugs Gang
work together, so where you see signs of one, look for the other. Millions of acres of valuable western forests are at risk!

Known Accomplices:



"Wild West Willie"
alias Western Pine Beetle

Kills elderly ponderosa pines. Group killing of trees is common in stands of dense, young, sawlog-size timber.

An adult western pine beetle. All bark beetles have a similar appearance, but are microscopically different.

Winding criscrossing gallery pattern identifies the presence of western pine beetle. Look for galleries under the bark of dead large pine.

"Do-'Em-In-Doug"
alias Douglas Fir Beetle

This troublemaker flies in for the kill, devouring the inner bark of sick or damaged firs.

An adult Douglas fir beetle many times actual size.

Blown-down Douglas fir provides ideal Douglas fir beetle habitat.

"Pine-box Pete"
alias Mountain Pine Beetle

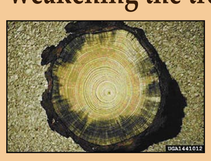
Violent appetite. Kills pines by gorging on inner bark.

An adult mountain pine beetle - all major bark beetles in western conifers have a similar appearance.

Mountain pine beetle attacks can quickly increase dead fuel loading and wildfire hazard across a landscape.

"Blue Stain Gus"
alias Blue Stain Fungus

This creepy villain is a front man for his beetle buddies, weakening the tree before they overcome it.

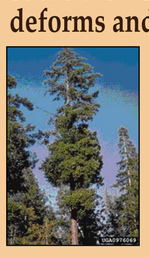


The staining fungus is introduced to the sapwood when attacking beetles enter a tree.

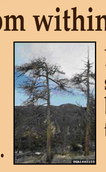
Blue staining fungus in spruce infects and quickly grows in the sapwood blocking the movements of water and nutrients. After a few months, the sapwood becomes blue to almost black.

"Shady Sadie"
alias Dwarf Mistletoe

Sadie works her slithery tendrils into the inner bark and deforms and sucks life from within the tree.



Huge Douglas fir mistletoe witches' brooms provide excellent hiding cover and nest sites. Note the thinning foliage above the highly flammable brooms. Mistletoe will kill this tree.



Dead ponderosa pine displaying skeletons of witches' brooms. Bark beetles killed these heavily infected trees, weakened by mistletoe.

Layered stand of lodgepole pine infected with mistletoe. The understory juvenile trees are infected by mistletoe shed from the overstory.

Millions of notorious killers are hiding out in our western forests.

Having never been snuffed out by wildfire, gangs of mean, mealymouthed insects are growing in numbers and strangling the life out of millions of trees throughout the Intermountain West.

Some of the deadliest gang members are the bark beetles. These heartless pests attack old trees and overstocked, "out-of-balance" forests weakened by diseases and drought. The bad bugs break into the trees and gorge themselves on rich, inner bark food stores. While tunneling about, they cut through extensive plumbing systems, cutting off supplies of water and nutrients that the trees need to survive.

In the Old, OLD West, slow-moving, natural ground fires helped to thin overstocked forests and "smoke out" bugs before they could get a foothold in the neighborhood. Periodically, natural fires killed small patches of old, dense timber - creating a landscape mosaic of healthy appropriately-stocked trees of various sizes and ages. These diverse forests were much less vulnerable to bark beetle attack. As these natural fires were suppressed over the past century, forests became overstocked havens for bark beetles and other unwanted pests.

Beetle-killed and diseased trees contribute to an abundance of both ground and ladder fuel, increasing the risk of dangerous, costly-to-control wildfires in already fire-vulnerable forests. This process is natural, but unacceptably out-of-balance with historic conditions.

REWARD

A return to healthy pine and larch forests.
We need your support.
Write or call your local Forest Ranger.

Healthy Forests Make a World of Difference!

WASHINGTON STATE DEPARTMENT OF Natural Resources

Gang of Culprits

Fuels the Fire!

The Diabolical Scheme

Step 1 The Stakeout

The criminal bugs quietly locate unhealthy trees with poor circulation.

Step 2 The Break-in

The thieves break into the tree, bringing with them their scumbug friends and other accomplices.

Step 3 The Hit

The beetles go to work immediately, tunneling, eating food stores and laying eggs. Tunnels cut off the flow of food and water which kills the host tree.

Step 4 Taking the Heat

The host dead, the larvae mature, and a new generation of beetles leaves to kill again. Larvae mature and leave,too. The dead tree falls apart as dry fuel for an intensely hot wildfire.

It was the work of a group of filthy, low-down, rotten scoundrels and scumbugs that killed the trees that are burning in the fires.

And, they did it SO quietly! For years, the Bad Bugs Gang has been at work attacking our trees in the Intermountain West.

These creeps got a foothold in our "out-of-balance" forests that are over-stocked, often with shade-tolerant climax tree species.

Without the low-intensity (cool) fires that once burned frequently across the landscape, these trees have become crowded and stressed as they compete for limited supplies of water and nutrients. These fires once maintained and cleaned up the forest by wiping out the weak trees and messy ground fuels. Aggressive fire suppression by humans since the early 1900s has kept these crowded trees alive - barely.

A healthy, fast-growing tree can lock out and resist beetles with strong sap flow that drowns the bugs before they can break in and tunnel about beneath the bark. But, without a good supply of water and nutrients to promote growth, the trees succumb to attacks by bark beetles. Once inside, the bugs dig their tunnels called "galleries" throughout the nutrient-rich inner bark of the tree, disrupting the "plumbing" and stopping the flow of water and nutrients.

To make things worse, beetles carry a nasty fungi into the trees. This blue staining fungus quickly infects the sapwood, further weakening the tree and making it even more vulnerable to the "Bad Bugs Gangs."

Beetle populations build up in weakened, drought-stressed stands, potentially becoming an outbreak. Outbreak populations can overcome healthy trees with " mass attacks" encouraged by beetle-produced pheromone attractants.

While inside the host tree, bark beetles release "aggregating pheromones" to attract their bad buddies. Together, they overwhelm even a healthy tree's defenses. Aggregating pheromones plus a pathogenic fungus infection help make relatively healthy trees a quick meal for bark beetles.

After killing the tree, a new generation of beetles leaves to find another host in which they can lay their eggs. The dead tree dries out and drops needles and branches on the forest floor. It's this dead, dry fuel that is burning right now in the forest fires!

Forest Friends... or Fiends?

Mistletoe is a slow tree killer. New Infections not yet producing shoots are "latent." The latent period lasts 2 to 5 years until new shoots appear. Many successive mistletoe crops may be produced from a single infection site.

The Good

Mistletoe plants and witches' brooms provide:

- Foraging area and food for birds and small mammals
- Hiding cover, roosts, and nest sites in large witches' brooms
- Snag habitat essential for cavity users

The Bad

An excess of mistletoe destroys habitat, impairs timber production, and makes the forest vulnerable to costly wildfires.

The Ugly

The benefits of mistletoe are lost in severely infected "out-of-balance" forests. Fire, a natural feature in a natural forest, helps control mistletoe. However, fire becomes a costly, destructive event in "out-of-balance" com-mercial forests, residential forests, and watersheds.

The Treatment

The strategy for managing mistletoe in stands allo-cated to timber production is simple:

- Prevent new infections following harvest
- Favor non-host alternate species
- Shift stand structure toward evenness

Even-aged harvesting techniques such as clearcutting, seedtree harvesting, and shelterwood harvesting are essential if mistletoeis to be minimized.

Bark Beetles As Forest Pros

Bark beetles are "pros" at their jobs of keeping forests healthy and balanced. Beetles evolved with Intermountain forests where they play many beneficial roles:

- Beetles "thin"naturally overstocked forests and create structural and vegetation diversity across the landscape.
- Beetle-killed trees provide a food source important to birds and other insect predators and snags for roosting and nesting habitat.
- Beetles help recycle old forests by introducing wood decay fungi through the bark to rapidly decompose wood and hasten nutrient recycling back into the soil and, hence, lowering fuels.
- Beetle outbreaks help build fuels necessary for stand replace-ment fires in patches of overstocked and decadent timber.

Dwarf mistletoe is a parasitic plant native to western forests. It depends on its host for water and nutrients. Mistletoe has seeds, stems, flowers, and roots like other plants, but it survives only on living trees. When the host tree or branch dies, mistletoe dies.

All major conifer species are infected by mistletoe. It is the most damaging disease of lodgepole pine, western larch, and Douglas fir in the Intermountain West.

Mistletoe seeds disperse in late summer or autumn. Seeds are "shot" like tiny bullets powered by water pressure from within the fruit. The sticky seeds adhere to needles on nearby branches. On a proper host, mistletoe seeds slide to the base of the needle and lodge on the thin bark of young branches where they germinate the following spring, establish a root system, and become a new infection. Trees can be infected at any age or size, but infection is most probable when trees are at least 5 to 10 feet tall or older than 10 years.

Mistletoe survives by stealing water and nutrients from the host tree. The loss of water and nutrients weakens the host slowing its growth. Severely infected trees suffer topkill and often die. Other forest pests, particularly bark beetles, may attack mistletoe-weakened trees causing quick death.

Bark Beetles As Forest Cons

Bark beetles don't become cons overnight. It takes years of abuse and neglect of the forests they live in before they become criminal pests.

Forests are "abused" in many ways. Drought, overstocking, root disease, ice and snow damage, poor growing conditions and many other environmental factors cause forests to become stressed, weakened and increasingly vulnerable to beetle attack.

At “normal” population levels and under normal conditions, bark beetles can only successfully attack trees suffering moisture stress induced by disease or damage. When too many trees become stressed, bark beetles respond in epidemic or outbreak numbers.

Normal populations of bark beetles are kept in check by wood-peckers and other insect-eating birds, parasitic wasps, and predatory beetles. These natural controlling agents, however, won't prevent an outbreak of bark beetles in susceptible, neglected forests.

Rehabilitation

Treatments Keep Good Bugs From Going Bad

Basic Forest Management Restores Balance to Forests

Fire is Nature's way of fixing unacceptable forest conditions.

Overstocked, beetle-killed forests will eventually be replaced by wildfire.

Alternatively, out-of-balance forests can be managed to renew tree health and improve stand vigor. Thinning harvests reduce fuel loadings and redistribute water, sunlight and nutrients to fewer trees, giving them a much-needed growth advantage.

Properly stocked forests are much more suitable for the re-introduction of safer, controlled prescribed fires that mimic natural fires. Carefully planned prescribed fires can help control fuel loading, forest stocking, composition, and diseases thereby reducing susceptibility to bark beetles.

Management actions that improve forest health and reduce the incidence of wildfire

Carefully thin overstocked stands, taking care to protect trees from logging injury.

●

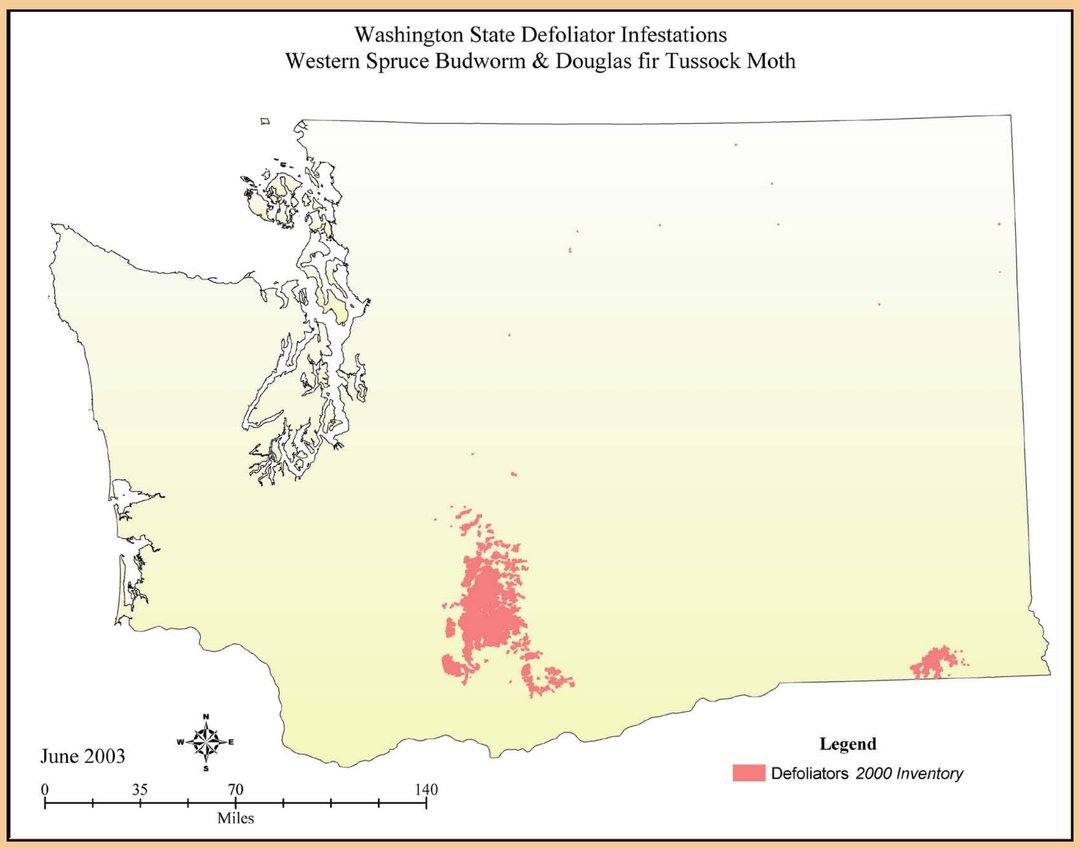
Reduce or remove slash and fuels by prescribed broadcast or pile burning during weather-safe seasons.

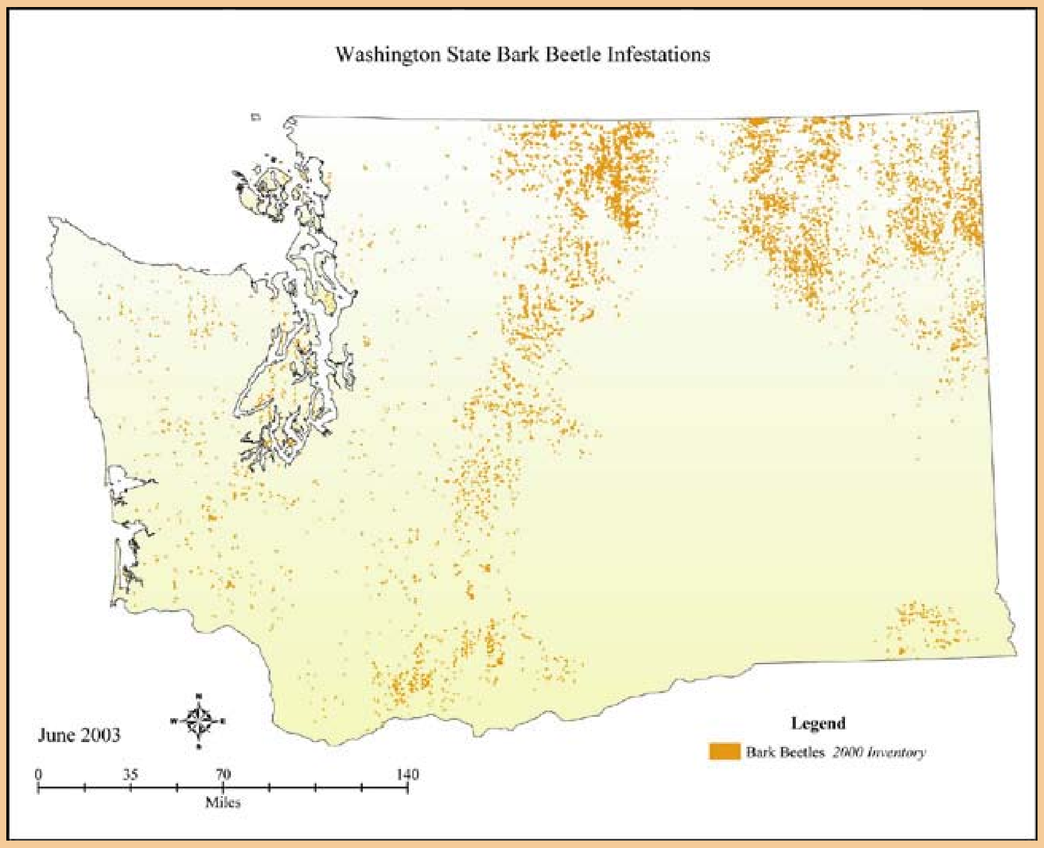
●

Regenerate stands with mixed, site-adapted tree species. Mixed stands are more resistant to insect pests.

Wanted: Support

Making Our Forests Healthy





The health of nearly two million acres of Washington forestland has been affected by insects and diseases, contributing to increases in dead trees, forest fuels and wildfire.

The National Fire Plan helps protect communities, natural resources, and the lives of firefighters and the public by fighting wildfires, rehabilitating and restoring burned areas, reducing hazardous fuels, research and community assistance ... your assistance.

You Can Help!

- **Join your local Community Fire Council.**
- **Help identify hazardous fuels near your community.**
- **Participate in fuel-reduction planning projects in the wildland-urban interface.**
- **Participate in Firewise projects that demonstrate effective forest management strategies for improving forest health.**
- **Support your local and volunteer fire departments.**
- **Work with your community leaders to raise citizen awareness of forest health, forest fuels and wildfire risks.**